

REMARKS/ARGUMENTS

The present Amendment is in response to the Office Action having a mailing date of February 23, 2005. Claims 1-48 are pending in the present Application. Applicant has amended claims 1, 23, 27, 37, 38, and 43. Applicant has also canceled claims 2 and 25. Applicant has added claims 49-58. Consequently, claims 1, 3-24, and 26-58 remain pending in the present Application.

Applicant has amended claim 1 to remove the limitation that the first and second nonmagnetic layers are conductive. Consequently, the first and second nonmagnetic layers may be conductive or insulating. Applicant has also amended claims 1, 23, 38, and 43 to recite that the first, second, third, and fourth write currents have first, second, third, and fourth magnitudes. Applicant has also amended claims 1 and 23 to recite that the first magnitude is different from the third magnitude and that the second magnitude is different from the fourth magnitude. Support for the amendment can be found in Figure 3A and the accompanying discussion. Applicant has also amended claims 27 and 37 to correct minor errors. Applicant has also amended claim 37 to remove recitations related to the first, second, third and fourth currents. Applicant has also added claims 49-58. Support for new claims 49-58 can be found in Figures 3A-3C and the present application as filed. Applicant respectfully submits that no new matter is added

In the above-identified Office Action, the Examiner objected to the drawings because the legend "Prior Art" was not included in Figure 1B. The Examiner also objected to claims 27 and 37 because of informalities. A replacement drawing sheet including Figure 1B has been filed herewith. Applicant has also amended claims 27 and 37 to correct the informalities cited by the Examiner. Accordingly, Applicant respectfully submits that the Examiner's objections have been addressed.

In the above-identified Office Action, the Examiner rejected claims 1-48 under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 6,847,547 (Albert). In so doing, the Examiner particularly cited Figure 4 and cols. 8, 9, 10, 11, 12, 13, and 18).

Applicant respectfully traverses the Examiner's rejection. Independent claims 1, 23, 38, and 43 all recite magnetic elements that have two free layers and/or devices which are programmable using first, second, third and fourth write currents. The first and third write currents are in a first direction, while the second and fourth write currents are in a second direction opposite to the first direction. Claims 1, 23, 38 and 43 recite that the magnitudes of the first and third currents are different, and that the magnitudes of the second and fourth currents are different. As a result, the magnetic elements recited in claims 1, 23, and 43 can be programmed to store multiple bits (e.g. states 00, 01, 10, and 11). See, for example, Figures 3B and 3C. Because a single magnetic element can be used to store multiple bits, memory density of a device using such magnetic elements may be increased.

Applicant agrees that Albert describes a magnetic element that can be programmed using spin transfer. Thus, the device of Albert is programmable by driving write currents through the magnetic element of Albert in a first direction or in a second direction opposite to the first direction. Although Albert functions well for its intended purpose, Applicant has found no mention in Albert of the magnetic element being configured such that the first write current (which can program the first free layer and/or first dual spin tunnel/valve structure) has a different magnitude than the third write current (which can program the second free layer and/or second dual spin tunnel/valve structure). Similarly, although Albert functions well for its intended purpose, Applicant has found no mention in Albert of the magnetic element being

configured such that the second write current (which can program the first free layer and/or first dual spin tunnel/valve structure) has a different magnitude than the fourth write current (which programs the second free layer and/or second dual spin tunnel/valve structure). Stated differently, Applicant has found no discussion in Albert of portions of the magnetic element of Albert being programmable using four currents in two directions and at least two pairs of the currents having different magnitudes. Consequently, Albert fails to teach or suggest the magnetic elements and methods recited in claims 1, 23, 38, and 43. Accordingly, Applicant respectfully submits that claims 1, 23, 38, and 43 are allowable over the cited references.

Claims 3-22 and claims 24 and 26-35 depend upon independent claims 1 and 23, respectively. Claims 39-42 and 44-48 depend upon independent claims 38 and 43, respectively. Consequently, the arguments herein apply with full force to claims 3-22, 24, 26-35, 39-42, and 44-48. Accordingly, Applicant respectfully submits that claims 3-22, 24, 26-35, 39-42, and 44-48 are allowable over the cited references.

Independent claim 36 recites a method for programming multiple bits in a magnetic element. In particular, claim 36 recites driving a first current through the magnetic element if a first state is to be written, driving at least a second current through the magnetic element if a second state is to be written, driving at least a third current through the magnetic element if a third state is to be written, and applying at least a fourth current after the first current if a fourth state is to be written. Thus, using the method recited in claim 36, multiple bits can be written *to the same magnetic element*.

As discussed above, although Albert functions well for its intended purpose, Albert fails to teach or suggest the possibility of driving four (or more) currents through a single magnetic element

in order to program multiple bits into the magnetic element. Consequently, for reasons similar to those discussed above, claim 36 is allowable over the cited references.

Claim 37 depends upon independent claim 36. Consequently, the arguments herein apply with full force to claim 37. Accordingly, Applicant respectfully submits that claim 37 is allowable over the cited references.

Moreover, claim 37 recites specific four write currents at which the magnetic element is programmable, as well as the relationship between these currents. As discussed above, although Albert functions well for its intended purpose, Albert fails to teach or suggest four write currents being capable of programming portions of a single magnetic element or the relationship between the write currents recited in claim 37. Consequently, Albert fails to teach or suggest the method recited in claim 37. Accordingly, Applicant respectfully submits that claim 37 is separately allowable over the cited references.

Claims 48-58 depend upon independent claims 1, 23, and 36. Consequently, the arguments herein apply with full force to claims 1, 23, and 36. Accordingly, Applicant respectfully submits that claims 1, 23, and 36 are allowable over the cited references.

Applicant's attorney believes that this application is in condition for allowance. Should any unresolved issues remain, Examiner is invited to call Applicant's attorney at the telephone number indicated below.

Respectfully submitted,
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Date

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Amendments to the Drawings

The attached replacement sheet of drawing include changes to FIG. 1B.